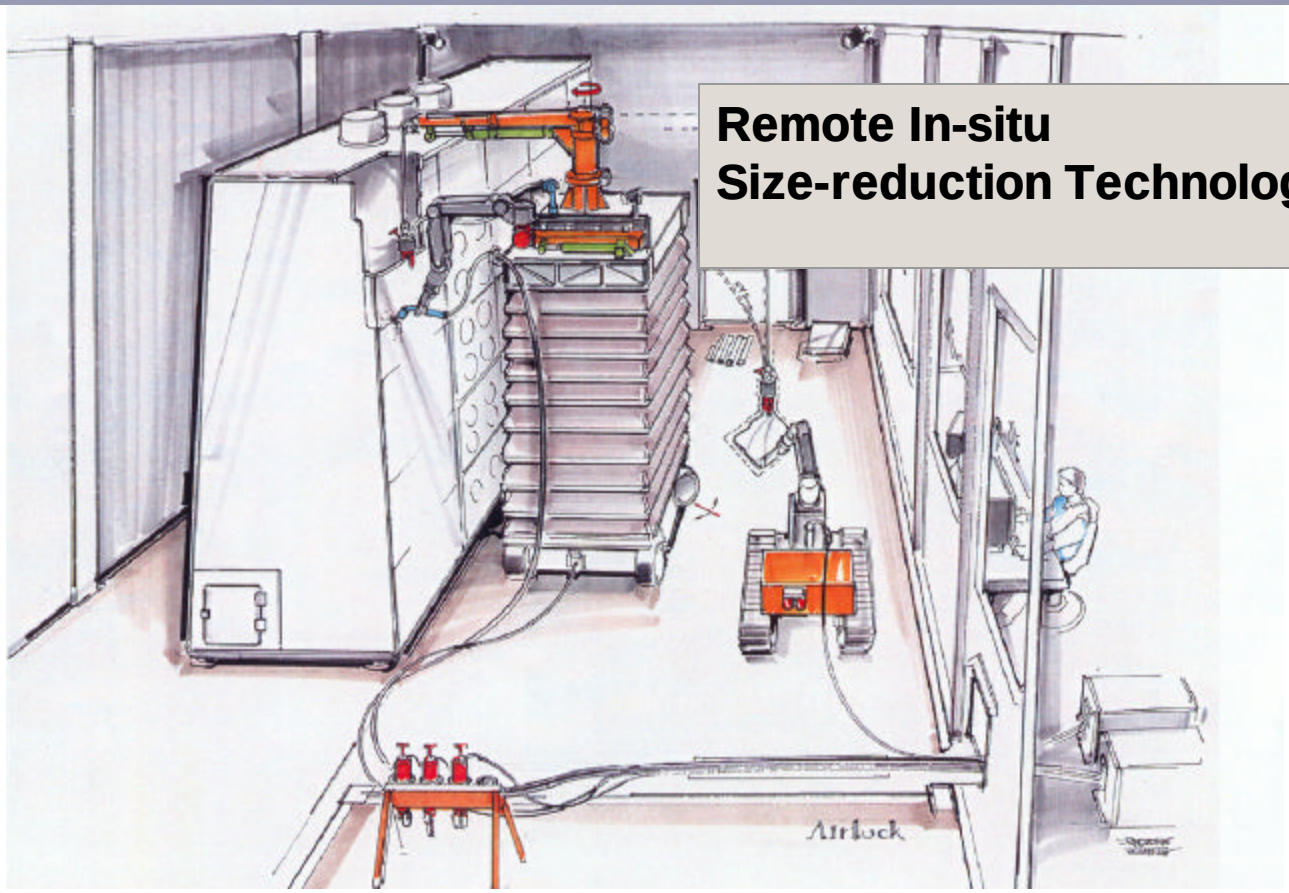

Remote In-situ Size-reduction Technology

Introduction

One of the most challenging and costly cleanup and closure tasks at the Rocky Flats Environmental Technology Site (Site) is the removal of contaminated equipment and gloveboxes from buildings where plutonium and uranium were processed during the production of weapons components. Before these buildings can be demolished, more than 900 gloveboxes, miles of process piping, and associated equipment must be decontaminated, cut up, packaged, and shipped to an appropriate repository. Conventional methods of size-reduction generate large amounts of transuranic waste and are time-consuming and costly. Workers who perform manual size-reduction face a substantial risk of exposure to radioactive material. The removal of extensive shielding and water-walls from some of the Site's biggest and most complex gloveboxes would expose workers to excessive radiation.

Challenge

Rocky Flats engineers had three objectives in mind when they investigated size-reduction technologies to match Site needs:

- Safely size-reduce gloveboxes and equipment pursuant to waste disposal requirements
- Improve worker safety by minimizing exposure to radioactive material and contamination
- Increase the rate of material throughput of items scheduled for decommissioning tasks.

Since some of the Site's gloveboxes are not only highly contaminated, but also too large to be removed to a centralized size-reduction facility, the ability to perform size-reduction on the production floor (in-situ) was an important criterion in the selection of suitable technology.

Solution

The Remote In-situ Size-Reduction system, designed by Rocky Flats engineers and jointly funded by the Department of Energy Office of Science and Technology's Accelerated Site Technology Deployment program, will be deployed in early 2002. The system, being manufactured by Redzone Robotics, consists of

- a mobile lift platform supporting a manipulator for cutting and a boom for lifting and lowering material to the floor
- a smaller, mobile platform with a manipulator for material handling and waste-box loading
- a set of mechanical and plasma cutting tools for size-reduction
- a video/control station, and
- a waste-packaging station for loading, weighing and sealing waste containers.

It is capable of placing any piece of size-reduced equipment into a standard waste box without manual intervention inside the containment enclosure. In addition, the unit is capable of determining the weight of each type of material packaged in individual waste containers.

The system will be used initially in Building 771, which houses several large glovebox lines. After these gloveboxes have been dismantled, other gloveboxes, equipment and tanks throughout the building can be placed in the containment area for size-reduction. When work in Building 771 is completed, the system will be moved to Building 371.

The system features enough flexibility in both mechanical and software design to accommodate a wide range of metal waste, enhanced cutting technology and tooling, and a graphical user interface to assist with operation and maintenance. It will also provide a waste stream that meets low-level and transuranic waste acceptance criteria for approved off-site disposal following final non-destructive assays.

Benefits

The efficient removal of plutonium-contaminated gloveboxes and equipment with the remote in-situ size-reduction system will reduce the generation of transuranic waste, enhance worker safety, and improve productivity. Life-cycle baseline costs will decrease and an accelerated decontamination and demolition schedule for the Site's plutonium-contaminated buildings will be realized.

Conclusion

The increase in productivity gained from this technology will greatly support Rocky Flats' 2006 Closure Plan while significantly decreasing risk to decommissioning workers. Since the system's tools are controlled automatically and remotely, workers are not required to wear personal protective equipment as they perform size-reduction tasks. The Department of Energy's mandate to reduce risks to workers and the environment has resulted in the acquisition of remote in-situ size-reduction technology that will enhance the Site safety initiative, provide cost-efficiency, and accelerate the closure effort.

U.S. Department of Energy

Make It Safe. Clean It Up. Close It Down.

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For further information about Rocky Flats

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Also, additional information about Rocky Flats is available on the internet at: http://www.rf.doe.gov